

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION**

ITEM NO. 9

TECHNICAL REPORT

FOR

**MODIFICATION OF A CALIFORNIA WATER CODE SECTION
13225/13267/13383 DIRECTIVE TO THE COUNTY OF ORANGE,
ORANGE COUNTY FLOOD CONTROL DISTRICT, CITIES OF
LAGUNA BEACH, LAGUNA HILLS, LAGUNA NIGUEL, LAGUNA
WOODS, LAKE FOREST AND MISSION VIEJO FOR
IMPLEMENTATION OF AN ACTION PLAN TO ADDRESS
ELEVATED BACTERIA LEVELS IN THE ALISO CREEK
WATERSHED**

**JEREMY HAAS
ENVIRONMENTAL SCIENTIST
NORTHERN WATERSHED PROTECTION UNIT**

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I. BACKGROUND

A. Introduction

On March 2, 2001 the Executive Officer issued a Directive pursuant to CWC Section 13225 for an investigation of urban runoff in the Aliso Creek watershed requiring that the County of Orange and the seven Cities within the watershed conduct weekly monitoring at the largest storm drain outfalls that discharge to Aliso Creek (Supporting Document 3). At the May 2001 meeting of the California Regional Water Quality Control Board, San Diego Region, the Regional Board affirmed the issuance of the Directive (Supporting Document 4). In doing so, the Regional Board established criteria under which the monitoring program could be revised. The monitoring program would continue until the Regional Board concludes that further monitoring under the directive is not necessary. Alternatively, monitoring at individual sites could be terminated once data demonstrate compliance with body-contact recreation objectives (REC-1) for three consecutive months.

The County of Orange, Orange County Flood Control District, City of Aliso Viejo, City of Laguna Beach, City of Laguna Hills, City of Laguna Niguel, City of Laguna Woods, City of Lake Forest, and City of Mission Viejo (Dischargers) have requested that the Regional Board revise the required monitoring program for the Aliso Creek watershed (Supporting Document 5).

B. Purpose Of The Monitoring Directive Issued In March 2001

The monitoring program was initiated by the Regional Board because the municipal storm water management program proposed by the Dischargers in September 2000 for the third-term NPDES requirements was considered inadequate to serve as a foundation to address the bacteria impairments in Aliso Creek and Aliso Beach. At that time, impairments were known to exist at several locations in the watershed. The full extent of impairment, however, was unknown. In December 1999 Cleanup and Abatement Order No. 99-211 was issued for discharges from one of the known problematic storm drains. Rather than issue an individual CAO for each of the known problematic storm drains, the Regional Board decided to require an investigation of the entire watershed.

The purpose of the investigation was to identify the source drains that were contributing to the elevated concentrations of fecal indicator bacteria in the inland and coastal receiving waters. Quarterly reports regarding BMP and program effectiveness were required to ensure the Dischargers would take appropriate management actions in response to the data.

C. Regional Board Amendments to the Monitoring Requirements in May 2001

At a well-attended meeting in Laguna Beach on May 9, 2001, the Regional Board added receiving water locations and established criteria for termination of the monitoring program (Supporting Document 4). Under the termination criteria, the monitoring program would continue until the Regional Board concludes that further monitoring under the directive is not necessary. Alternatively, monitoring at individual sites could be terminated once data demonstrate compliance with body-contact recreation objectives (REC-1) for three consecutive months.

D. Current Monitoring Program

Currently, monitoring is conducted at the largest 37 storm drains and the receiving waters 25 feet upstream and downstream of the discharge point. Samples are also collected at in Aliso Creek in the lower watershed at two sites within Aliso and Wood Canyons Regional Park and at the mouth of Aliso Creek. Parameters measured include:

1. Total and fecal coliforms and Enterococcus (all sampled sites and times).
2. Total chlorine (all sampled sites and times).
3. pH (storm drains only, once per month).
4. Temperature (storm drains and downstream stations, all sampled times).
5. Estimated flow (storm drains only, all sampled times).

In addition, the Dischargers occasionally collect and report supplemental monitoring results for source reconnaissance or BMP evaluation purposes.

E. Results of the Weekly Monitoring

Weekly monitoring to date has demonstrated that inland receiving waters near storm drain outfalls rarely meet REC-1 standards and do not consistently meet non-contact recreation objective (REC-2). The sampling has confirmed that storm drain discharges affect the quality of the receiving waters. Receiving water stations 25 feet upstream of storm drain outfalls meet REC-2 more often than stations 25 feet downstream of the outfalls. The data suggests that REC-1 objective is unlikely to be met in the near future near storm drain outfalls.

The monitoring has also demonstrated that the REC-2 objective is met more consistently in the lower watershed, including Aliso and Wood Canyons Regional Park, the mouth of Aliso Creek, and the Aliso Beach surfzone. The REC-1 objective is often met in the surfzone. The sampling program has also resulted in a greater understanding of seasonal variations and a recognition that the assimilative capacity of certain areas is compromised by hydromodification and clustering of large storm drain outfalls.

F. Use of the Weekly Monitoring Program

The initial data identified widespread inland impairments. In response the Dischargers prioritized the storm drain outfalls within each of their jurisdictions for targeted management efforts. Quarterly progress reports indicate that the Dischargers are employing a variety of approaches to reduce bacteria in urban runoff discharges, and planned activities have been included in the Aliso Creek Watershed Urban Runoff Management Program (WURMP). Data from the high-priority storm drains has been used to evaluate effectiveness of management activities. Data from many of the weekly monitoring stations, however, has been used only for baseline trend purposes.

In anticipation of proposing revisions to the monitoring program, the Dischargers conducted an analysis of the data generated by the first 3 years of sampling. This analysis was used to select a sampling period and frequency and to look for observable effects of BMPs. The analysis also ranked the storm drains by loads and impact on receiving waters (see Appendix B of Supporting Document 5).

II. THE PROPOSED MODIFIED MONITORING PLAN

A. Objective Of The Proposed Monitoring Plan Revisions

The Dischargers have proposed monitoring program revisions based on a review of the previous data, recreational use within the watershed, and anticipated action plans. The proposed program focuses monitoring on a group of status and trends sites near the bottom of the watershed and a second set of BMP evaluation sites at high-priority drains throughout the watershed. Monitoring would occur at a higher frequency, but only during the summer as an indicator of annual conditions. The County's statistical analysis

indicates the proposed design would track compliance with REC-1 standards in the lower watershed and document the effectiveness of BMPs implemented at the high-priority drains. The objectives for each group of sites is the following:

1. *Status and Trends Monitoring.* Five sites in the lower watershed are proposed for long-term trend analyses. The sampling design objective is to detect an 80% reduction in fecal Coliform levels in summer months over a ten-year period. An 80% reduction would represent a drop to near REC-1 levels. The summer period was selected as being most representative of potential REC-1 usage, as well as the season with the highest bacteria concentrations. These five sites would be monitored 10 times per month for August and September.
2. *BMP Evaluation Monitoring.* Nine sites in the upper, developed, portion of the watershed are proposed initially for BMP evaluation monitoring. The sampling objective is to detect an average 50% reduction in loads and an average 20% reduction in impact (measured as the difference between downstream and upstream receiving water stations near the outfall) in the summer over a ten year period. These nine sites would be monitoring 20 times over the period from June to September.

B. Selection of the Proposed Monitoring Stations

The proposed trend monitoring stations were selected to focus effort on areas of highest recreational use. Five core stations along the lower sections of Aliso Creek were targeted. The Orange County Health Care Agency will continue to monitor the mouth of Aliso Creek and Aliso Beach. The core trends stations proposed include:

1. Aliso Creek at the AWMA Road bridge.
2. The confluence of Sulphur Creek and Aliso Creek.
3. Aliso Creek in the Aliso Wood Canyon Park at the current NPDES mass emission station.
4. The confluence of Wood Canyon Channel and Aliso Creek.
5. Aliso Creek at the SOCWA Coastal Treatment Plant.

The proposed BMP evaluation monitoring stations were selected to focus monitoring activities on the areas in the watershed where the most concentrated BMP efforts have been occurring. Nine locations within the six high-priority drainage areas were selected. The BMP evaluation stations proposed include:

1. J01P08 outfall at Aliso Creek in the City of Lake Forest.
2. J07P02 outfall at Aliso Creek in the City of Mission Viejo.
3. J06 drain in the City of Laguna Woods.
4. J06 drain at Aliso Creek in the City of Laguna Woods.
5. J05 outfall at Aliso Creek in the City of Laguna Hills.
6. J01P28 outfall at Aliso Creek, in unincorporated County of Orange, and draining the City of Aliso Viejo.
7. J01P28 ultraviolet treatment system at the confluence with Aliso Creek.
8. J01P28 drain within the City of Aliso Viejo.
9. J04 drain at the confluence with the J03 drain in the city of Laguna Niguel.

C. Cost Saving from the Revised Program

The proposed revisions would substantially reduce the amount of bacteria monitoring in the watershed. The County anticipates that the annual cost for the monitoring program would drop by 90%. Expected costs of the proposed action plans was not provided.

D. Regional Board Enforcement of the Monitoring Plan

Reporting of the monitoring plan's results would be required by the Regional Board pursuant to California Water Code Section 13267.

E. Monitoring Parameters of the Revised Program

Monitoring at the revised sites and frequencies would continue to rely on the indicators currently used, specifically:

1. Total and fecal coliforms and Enterococcus (all sampled sites and times).
2. Total chlorine (all sampled sites and times).
3. pH (storm drains only, once per month).
4. Temperature (storm drains and downstream stations, all sampled times).
5. Estimated flow (storm drains only, all sampled times).

F. Monitoring Information Discontinued under the Revised Program

The revised plan would abandon approximately 28 storm drain sampling locations. In addition, the plan would not collect data during the Winter, Spring, and Fall. The current plan does not sample storm events, so no information with respect to storm event discharges would be lost.

G. New Monitoring Information That Would Be Obtained under the Revised Plan

The revised plan would provide statistically valid answers to the proposed monitoring objectives. The current monitoring has demonstrated a high level of variability in both the storm drain and receiving water data. The revised plan was produced based on power analyses of the data to determine sampling frequencies to meet the two sets of proposed monitoring objectives (see Appendix B of Supporting Document 5).

H. Duration of the Revised Monitoring Program

The revised program proposes to monitor the trend sites in the lower watershed until REC-1 has been achieved for three consecutive months. At that time the Dischargers would consider adding additional receiving water locations within the watershed. Monitoring at the BMP effectiveness stations would continue until the BMPs are

considered effective, at which time the monitoring effort would be shifted to the next level of priority drains.

It is likely, however, that the bacteria monitoring program in the watershed would be revised upon adoption of the TMDL implementation plan for Bacteria-Impaired Waters TMDL Project I for Beaches and Creeks. That TMDL is tentatively scheduled to be considered by the Regional Board at the end of this year or early 2006. In order to meet the waste load allocations of the TMDL, an Implementation Plan will also be developed that describes the pollutant reduction actions that must be taken by various responsible parties to meet the allocations.

I. Impact of the Bacteria TMDL

The proposed monitoring plan revisions would effectively be an interim plan until the TMDL is adopted and there is more certainty regarding the monitoring necessary to demonstrate compliance with the waste load allocations (e.g., compliance points) and water quality based effluent limits (e.g., iterative BMPs or numeric targets). An expanded program is expected following adoption of the TMDL. For instance, stormwater monitoring may be necessary.

In addition, based on the draft TMDL and in contrast to the expectations of the March 2001 Directive, up to 15 years may be allowed to achieve the waste load allocation. The Regional Board has discretion to decide frequency of monitoring to assess both water quality based effluent limits and waste load allocations of the TMDL. It is expected that the TMDL waste load allocations and monitoring program would be incorporated into the next round of municipal NPDES requirements in Spring 2007.

III. OPTIONS FOR THE REGIONAL BOARD

A. Reject Any Changes to the Monitoring Program

The Regional Board may decide that continued weekly monitoring at the current locations and quarterly reporting is warranted.

1. *Benefits of Option A.* The data provides a continuous estimate of storm drain discharges and receiving water conditions. The data can be used to detect short-term changes in water quality and compare seasonal variation.
2. *Limitations of Option A.* The data analyses conducted by the Dischargers indicates the value of the current monitoring design to identify trends or BMP effectiveness is limited by the high variability in the data. The monitoring program has already established baseline watershed conditions and high-priority areas. As a result, the current monitoring program continues to require substantial resources while providing limited benefits.

B. Approve the Proposed Modifications to the Monitoring Program

The Regional Board may decide that the current program is no longer necessary and to approve the proposed changes to the bacteria monitoring program.

1. *Benefits of Option B.* The revised monitoring frequency was based on an examination of patterns over 3 years of Aliso Creek bacteria data as well as on statistical power analyses of the data. The analyses indicate that a sampling frequency of 10 samples per month collected in August and September would provide the ability to track trends over time with the goal of detecting an 80% reduction in fecal Coliform levels over a 10-year period. An 80% reduction would represent a drop from the highest current levels to the REC-1 level. The analyses for BMP evaluation sampling showed that for most high-priority stations a sampling of 20 samples, collected between June and September, would be adequate to detect an average 50% reduction in loads and an average 30% reduction in impact over a ten-year period.
2. *Limitation of Option B.* The proposed monitoring revisions would not provide data for most of the year. The highest bacteria levels are typically found in the Summer and Fall. The proposed monitoring would not sample storm events, but neither does the current program. In addition, the proposed sampling frequency would not be able to track load reductions at station J06, nor track impacts at station J01P08 because of the annual variability at these stations. In addition, the BMP evaluation monitoring would track the cumulative BMP efforts within the high-priority drainage areas, but not necessarily the effectiveness of individual BMPs.

C. Add Monitoring Locations to the Proposed Revised Monitoring Program

The Regional Board may decide to approve the proposed monitoring program with modifications to add sampling locations.

1. *Benefits of Option C.* Additional locations could be selected based on various criteria, each providing benefit. Sites could be selected that ranked high on the analyses of discharge loads or impact on receiving waters. Alternatively, sites could be selected that represent additional drainage area. Furthermore, various receiving water locations in the upper watershed could be selected to complement those in the lower watershed.
 - a. Load Rankings. The storm drain locations with the highest load rankings not included in the proposed plan include J02P08, J03P02, J01P27, J02P05, and J01P03. (Note: J02 refers to Wood Canyon locations, J03 refers to Sulphur Creek locations; and J01 refers to Aliso Creek locations.)
 - b. Impact Rankings. The rankings of storm drain locations with the highest impact (measured as the difference between adjacent upstream and downstream receiving water locations) are not included in the proposed plan. The rankings may be available from the Dischargers.

- c. Drainage Area Rankings. The storm drain locations with the largest drainage areas not included in the proposed plan include: J03P01, J01P06, J03P02, J01P01, and J01P03.
2. *Limitations of Option C*. The selection of proposed sites was based on the objectives of the Dischargers' Watershed Urban Runoff Management Plan and the power analysis of the data. The potential benefit of additional storm drain monitoring locations may not be realized if additional action plans are not developed and implemented within the drainage areas. In addition, the power analyses indicate that the ability of the sampling program to track the management objectives may not be feasible at some of the current sampling locations.

D. Add Monitoring Events to the Proposed Monitoring Program

The Regional Board may decide to approve the proposed monitoring program with modifications to increase the sampling frequency or timespan.

1. *Benefits of Option D*. Depending on the results from the corresponding power analyses, additional sampling frequencies could result in the ability to track the management objectives sooner than 10 years or to detect a smaller change in conditions within the 10 year timeframe. This may be useful in the future, for instance, if the TMDL includes compliance milestones shorter than 10 years. Adding sampling events outside of the summer season would provide more information regarding the current water quality at those sites. Storm season sampling, for instance, could provide information regarding discharges in stormwater.
2. *Limitations of Option D*. For some sites additional sampling frequencies may not provide a higher level of statistical certainty. While sampling during non-summer months would provide assessments during those times, it may not necessarily correspond to times of significant recreational use or be statistically significant to track trends. Additional analyses would be required to determine the value of additional sampling events.

IV. SUMMARY

The municipal dischargers in the Aliso Creek watershed have been conducting weekly monitoring at approximately 35 storm drains and adjacent receiving waters for over four years. This monitoring has established baseline conditions and identified the storm drains that contribute significant amounts of bacteria to inland waters and result in a significant impact to inland waters. Contact recreation objectives (REC-1) are not being met in the inland waters and are not likely to be met in the short term. The pending Bacteria-Impaired Waters TMDL Project I for Beaches and Creeks will establish a timetable for compliance with waste load allocations.

The Dischargers have proposed a revised monitoring plan that directs monitoring toward the high-priority storm drains in the upper watershed and the receiving waters in the lower watershed during the summer months. The objectives of the revisions are to assess the status and trends in the lower watershed and to evaluate the effectiveness of BMP implementation at high-priority sites in the upper watershed. The monitoring program may be expanded following adoption of an implementation plan for the Bacteria-Impaired Waters TMDL Project I for Beaches and Creeks.

Concurrent with the revised monitoring program, the Dischargers have updated the Aliso Creek Watershed Urban Runoff Management Plan (WURMP) to identify specific action plan items.

Based on statistical power analyses, the proposed monitoring plan would achieve its objectives. The objectives for trends are reasonable given the variability of water quality and innumerable sources of bacteria that contribute to concentrations in the lower watershed. The objectives for BMP evaluation are reasonable provided the Dischargers follow through on commitments within the Aliso Creek WURMP and implement an iterative approach to BMP implementation that incorporates findings from their efforts and other BMP effectiveness studies.